TEXAS AGRICULTURAL EXPERIMENT STATION

BULLETIN NO. 214 APRIL, 1917

# PROGRESS REPORT, SUBSTATION NO. 1, BEEVILLE, TEXAS

1910-1914


B. YOUNGBLOOD, M. S., DIRECTOR

COLLEGE STATION, BRAZOS COUNTY, TEXAS.

[Blank Page in Original Bulletin]

A93-517-15m

TEXAS AGRICULTURAL EXPERIMENT STATION

BULLETIN NO. 214 APRIL, 1917

# PROGRESS REPORT, SUBSTATION NO. 1, BEEVILLE, TEXAS

1910-1914

E. E. BINFORD, B. S.,
Superintendent

B. YOUNGBLOOD, M. S., DIRECTOR
COLLEGE STATION, BRAZOS COUNTY, TEXAS.

AUSTIN, TEXAS:
VON BOECKMANN-JONES CO., PRINTERS,
1917

# TEXAS AGRICULTURAL EXPERIMENT STATION

## BOARD OF DIRECTORS

JOHN I. GUION, *President*, Ballinger.....Term expires 191
L. J. HART, *Vice-President*, San Antonio.....Term expires 191
E. H. ASTIN, Bryan.....Term expires 191
J. R. KUBENA, Fayetteville.....Term expires 192
A. B. DAVIDSON, Cuero.....Term expires 192
WILL A. MILLER, JR., Amarillo.....Term expires 192
JOHN C. DICKSON, Paris.....Term expires 192
H. A. BREIHAN, Bartlett.....Term expires 192
F. M. LAW, Houston.....Term expires 192

## MAIN STATION COMMITTEE

L. J. HART, *Chairman* WILL A. MILLER, JR.

## GOVERNING BOARD, STATE SUBSTATIONS

P. L. DOWNS, *President*, Temple.....Term expires 191
CHARLES ROGAN, *Vice-President*, Austin.....Term expires 191
W. P. HOBBY, Beaumont.....Term expires 191
J. E. BOOG-SCOTT, Coleman.....Term expires 192

## STATION STAFF*

**ADMINISTRATION**
B. YOUNGBLOOD, M. S., *Director*
A. B. CONNER, B. S., *Vice Director*
CHAS. A. FELKER, *Chief Clerk*
A. S. WARE, *Secretary*

**DIVISION OF VETERINARY SCIENCE**
†M. FRANCIS, D. V. S., *Veterinarian in Charge*
H. SCHMIDT, D. V. M., *Veterinarian*

**DIVISION OF CHEMISTRY**
G. S. FRAPS, Ph. D., *Chemist in Charge; State Chemist*
W. T. P. SPROTT, B. S., *Assistant Chemist*
CHARLES BUCHWALD, M. S., *Assistant Chemist*
G. B. L. SMITH, A. M., *Assistant Chemist*

**DIVISION OF HORTICULTURE**
H. NESS, M. S., *Horticulturist in Charge*
W. S. HOTCHKISS, *Horticulturist*

**DIVISION OF ANIMAL HUSBANDRY**
J. C. BURNS, B. S., *Animal Husbandman, Feeding Investigations*
J. M. JONES, A. M., *Animal Husbandman, Breeding Investigations*
†L. B. BURK, B. S., *Animal Husbandman, Swine Investigations.*

**DIVISION OF ENTOMOLOGY**
F. B. PADDOCK, M. S., *Entomologist in Charge; State Entomologist*
H. J. REINHARD, B. S., *Assistant Entomologist*

**County Apiary Inspectors**

R. C. Abernathy, Ladonia; William Atchley, Mathis; J. W. E. Basham, Barstow; Victor Boeer, Jourdanton; T. W. Burleson, Waxahachie; W. C. Collier, Goliad; E. W. Cothran, Roxton; G. F. Davidson, Pleasanton; John Donegan, Seguin; A. R. Graham, Milano; J. B. King, Batesville; N. G. LeGear, Waco; R. A. Little, Pearsall; M. C. Stearns, Brady; S. H. Stephens, Uvalde; M. B. Tally, Victoria; James W. Traylor, Enloe; R. E. Watson, Heidenheimer; W. H. White, Greenville; W. P. Bankston, Buffalo; F. C. Belt, Ysleta.

**DIVISION OF AGRONOMY**
A. B. CONNER, B. S., *Agronomist in Charge*
A. H. LEIDIGH, B. S., *Agronomist*
LOUIS WERMELSKIRCHEN, B. S., *Agronomist*

**DIVISION OF PLANT PATHOLOGY AND PHYSIOLOGY**
J. J. TAUBENHAUS, Ph. D., *Plant Pathologist and Physiologist in Charge*
A. D. JOHNSON, B. S., *Graduate in Charge.*

**DIVISION OF POULTRY HUSBANDRY**
R. N. HARVEY, B. S., *Poultryman in Char*

**DIVISION OF PLANT BREEDING**
E. P. HUMBERT, Ph. D., *Plant Breeder i Charge*
J. S. MOGFORD, B. S., *Graduate Assistant*

**DIVISION OF DAIRYING**
J. E. HARPER, M. S., *Dairyman in Charg*

**DIVISION OF FEED CONTROL SERVICE**
JAMES SULLIVAN, *Executive Secretary*
J. H. ROGERS, *Inspector*
W. H. WOOD, *Inspector*
T. H. WOLTERS, *Inspector*
S. D. PEARCE, *Inspector*
W. M. WICKES, *Inspector*

**SUBSTATION NO. 1: Beeville, Bee Coun**
E. E. BINFORD, B. S., *Superintendent*

**SUBSTATION NO. 2: Troup, Smith Coun**
W. S. HOTCHKISS, *Superintendent*

**SUBSTATION NO. 3: Angleton, Brazoria County**
N. E. WINTERS, B. S., *Superintendent*

**SUBSTATION NO. 4: Beaumont, Jefferso County**
H. H. LAUDE, B. S., *Superintendent*

**SUBSTATION NO. 5: Temple, Bell County**
D. T. KILLOUGH, B. S., *Superintendent*

**SUBSTATION No. 6: Denton, Denton Coun**
C. H. MCDOWELL, B. S., *Superintendent*

**SUBSTATION NO. 7: Spur, Dickens Coun**
R. E. DICKSON, B. S., *Superintendent*

**SUBSTATION NO. 8: Lubbock, Lubbock County**
R. E. KARPER, B. S., *Superintendent*

**SUBSTATION NO. 9: Pecos, Reeves Coun**
J. W. JACKSON, B. S., *Superintendent*

**SUBSTATION NO. 10: (Feeding and Bree ing Substation) College Station, Braz County**
E. R. SPENCE, B. S., *Animal Husbandma in Charge of Farm*

**SUBSTATION NO. 11: Nacogdoches, Naco doghes County**
G. T. MCNESS, *Superintendent*

****SUBSTATION NO. 12: Chillicothe, Hard man County**
R. W. EDWARDS, B. S., *Superintendent*

**SUBSTATION NO. 14: Sonora, Sutton County**
E. M. PETERS, B. S., *Acting Superintende*

## CLERICAL ASSISTANTS

J. M. SCHAEDEL, *Stenographer*
DAISY LEE, *Registration Clerk*
W. F. CHRISTIAN, *Stenographer*
ELIZABETH WALKER, *Stenographer*
E. E. KILBORN, *Stenographer*
C. L. DURST, *Mailing Clerk*
A. T. JACKSON, *Stenographer*
CARL ABELL, *Scientific Assistant*
F. C. MARCOULIDES, *Stenographer*

*As of May 1, 1917.
†In cooperation with the A. and M. College of Texas.
**In cooperation with United States Department of Agriculture.

## FOREWORD.

The annual progress reports of the various substations may be considered part of the general annual report. Much credit is due Mr. A. B. Conner, in his capacity as Vice Director, and Mr. A. H. Leidigh, in his capacity as Agronomist, for painstaking work in checking figures and editing this and other substation progress reports, and grateful acknowledgment is hereby made.

B. YOUNGBLOOD,
Director

[Blank Page in Original Bulletin]

# PROGRESS REPORT, SUBSTATION NO. 1, BEEVILLE, TEXAS, 1910–1914.

BY

E. E. BINFORD, SUPERINTENDENT.

Substation No. 1 of the Texas Agricultural Experiment Station was established in 1895, distant 5.7 miles northeast of Beeville, Bee County, Texas, on a tract of land containing 151.5 acres, situated 28 degrees and 32 minutes north latitude and 97 degrees and 38 minutes west longitude. The elevation is 240 feet above sea-level.

The substation was established for the study of the agricultural problems of Southwest Texas, and much work has been done in this direction. A number of publications have been issued setting forth these results.

This farm is representative of a large region of Southwestern Texas, in which the Victoria series is the prevailing soil type. A part of the substation farm is made up of Victoria loam soil. Small amounts of Victoria clay loam and Victoria sandy loam are also present.

## CLIMATOLOGICAL DATA—1910-1914.

The distribution of the rainfall by months, together with the annual rainfall from 1910 to 1914 inclusive, is given in the following table:

**TABLE 1—RAINFALL BY MONTHS—1910-14 INCLUSIVE.**

| Month. | Inches. | | | | | |
|---|---|---|---|---|---|---|
| | 1910 | 1911 | 1912 | 1913 | 1914 | Average. |
| January | 2.61 | 0.29 | 0.57 | 0.31 | 0.10 | .776 |
| February | 0.75 | 1.59 | 4.83 | 1.56 | 0.93 | 1.932 |
| March | 3.93 | 2.71 | 0.87 | 1.49 | 2.46 | 2.292 |
| April | 3.51 | 4.33 | 3.84 | 0.29 | 6.31 | 3.656 |
| May | 3.90 | 5.52 | 7.05 | 0.13 | 9.03 | 5.126 |
| June | 3.22 | 2.15 | 2.38 | 5.10 | 0.11 | 2.592 |
| July | 1.04 | 0.00 | 0.11 | 0.22 | 1.07 | .488 |
| August | 0.76 | 0.00 | 0.48 | 1.39 | 10.60 | 2.646 |
| September | 5.93 | 1.27 | 1.82 | 11.13 | 1.28 | 4.286 |
| October | 0.93 | 0.50 | 4.71 | 4.02 | 9.39 | 3.910 |
| November | 0.30 | 2.45 | 1.23 | 4.63 | 3.22 | 2.366 |
| December | 1.71 | 3.83 | 1.43 | 1.47 | 1.00 | 1.888 |
| Total | 28.59 | 24.64 | 29.32 | 31.74 | 45.50 | 31.958 |

It would seem that the rainfall is generally quite plentiful during March, April, May and June, followed by rather dry periods during July and August and an abundance of rain in September and October. The winter months generally show low rainfall. The lowest annual rainfall recorded in the five-year record presented is 24.64 inches in

1911. The highest is 45.50 inches in 1914. The average for the period is 31.958 inches. It would appear that crops planted in February would more likely give high production than crops planted in March or April, and that July planting would be safer than June or May planting.

The maximum and minimum temperatures for each month for the years from 1910 to 1914 are shown in the following table:

**TABLE 2—NORMAL MONTHLY MAXIMUM AND MINIMUM TEMPERATURES—1910-14.**

| Month. | Degrees Fahrenheit. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1910 | | 1911 | | 1912 | | 1913 | | 1914 | | Average. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Mean |
| January | 84 | 22 | 96 | 12 | 80 | 22 | 79 | 26 | 82 | 31 | 84.2 | 22.6 |
| February | 86 | 24 | 91 | 30 | 80 | 22 | 74 | 32 | 84 | 26 | 83.0 | 26.8 |
| March | 92 | 44 | 98 | 42 | 78 | 35 | 90 | 28 | 82 | 32 | 88.0 | 36.2 |
| April | 92 | 48 | 96 | 54 | 88 | 46 | 90 | 42 | 92 | 38 | 91.6 | 45.6 |
| May | 96 | 58 | 99 | 56 | 92 | 59 | 96 | 56 | 89 | 60 | 94.4 | 57.8 |
| June | 104 | 62 | 107 | 68 | 94 | 62 | 96 | 68 | 98 | 68 | 99.8 | 65.6 |
| July | 106 | 70 | 100 | 70 | 100 | 70 | 99 | 70 | 103 | 68 | 101.6 | 69.6 |
| August | 106 | 70 | 109 | 70 | 102 | 72 | 101 | 70 | 103 | 70 | 104.2 | 70.4 |
| September | 100 | 62 | 106 | 70 | 99 | 60 | 99 | 60 | 98 | 56 | 100.4 | 61.6 |
| October | 100 | 40 | 100 | 40 | 99 | 38 | 89 | 38 | 93 | 44 | 96.2 | 40.0 |
| November | 92 | 39 | 90 | 24 | 85 | 32 | 88 | 42 | 84 | 38 | 87.8 | 35.0 |
| December | 88 | 30 | 84 | 31 | 77 | 30 | 77 | 34 | 78 | 25 | 80.8 | 30.0 |

It will be seen from the foregoing table that summer temperatures of 102 and 103 degrees are not uncommon in July and August. It will be observed further that the temperature in winter seldom ranges below 20 degrees Fahrenheit, having gone lower than this only once in the five years, which occurred in January, 1911, when a minimum temperature of 12 degrees was recorded. The average maximum temperature for the five-year period shows a winter temperature of 80 to 85 degrees, and a summer temperature of 99 to 104 degrees. The average mean temperature for the five-year period shows a minimum winter temperature of 22 to 30 degrees and a minimum summer temperature of 65 to 70 degrees Fahrenheit.

The following table shows dates of the last frost in the spring and the first frost in the fall for a five-year period, beginning in 1910 and ending in 1914:

**TABLE 3—DATES OF FROST.**

| | 1910 | 1911 | 1912 | 1913 | 1914 |
|---|---|---|---|---|---|
| Last frost, spring | Feb. 25 | Feb. 23 | Mar. 25 | Mar. 16 | Mar. 13 |
| First frost, fall | Dec. 24 | Nov. 13 | Dec. 23 | Oct. 27 | Dec. 10 |

It will be observed that the last frosts at the beginning of the season occurred from February 23 to March 25. The first frosts at the close of the crop season, during the five-year period ranged from October 27 in 1913 to December 24 in 1910. Frosts have occurred between December 10 and December 24 in three years out of five.

## SCOPE OF WORK.

Prior to the season of 1912 the work was devoted almost entirely to ruck and fruit crops. The following named publications, based on ork done here, have been issued:

"Report for Beeville Substation," Bulletin No. 43. (Out of print.)

"Corn Experiments at College Station and Beeville," Bulletin No. 49. Out of print.)

"Cotton Experiments at College Station and Beeville," Bulletin No. 0. (Out of print.)

"Cabbage and Cauliflower, Beeville No. 3," Bulletin No. 52. (Out f print.)

"Cabbage and Cauliflower, Beeville No. 4," Bulletin No. 57. (Out f print.)

"Growing Onions, Beeville No. 5," Bulletin No. 60. (Out of print.)

"Cabbage, Beeville No. 6," Bulletin No. 66. (Out of print.)

"Onions and Bunch Crops," Bulletin No. 77. (Out of print.)

"Fertilizer Test with Onions," Bulletin No. 115. (Out of print.)

"Report of Progress with Citrus Fruits," Bulletin No. 118. (Out f print.)

"Report on Experiments with Citrus Fruits at the Beeville Sub- tation," Bulletin No. 148.

Beginning in 1912 the amount of experiment work on this substation vas very greatly enlarged, more land was put into cultivation, par- icular attention being paid to the need of more experiment data rela- ive to general field crops and the method of producing them in this art of the State.

This is the first bulletin that has been issued relative to Substation No. 1, since the enlargement and broadening of the substation's activ- ties, and it will be noted that marked progress has been the result from his work with field crops.

## EXPERIMENT DATA.

The material presented herein is merely a summary of the work done or the period. No attempt is made to present detailed records.

Cotton, corn, legumes, grain sorghums, clovers, Sudan grass, vege- ables, grape fruit, oranges and other fruits are discussed.

All agronomic work has been done in plats, ranging from 1/110 to /5 of an acre in size, but in all cases the experiment plats have been ncluded in a regular cropping system, which provides that the same rop precede a given series on plats from year to year, thus affording niform moisture and soil conditions. Guard rows have been used in ll cases.

## COTTON VARIETY TEST.

A cotton variety test was conducted over a period of three years— 912, 1913 and 1914. Extreme weather conditions during the season f 1913 so affected the test that no results were secured. The 1912

test included thirty-three varieties and the 1914 test fifty-four varieties. The best results secured from the two years' work are shown:

**TABLE 4—COTTON VARIETY TEST—FIFTEEN HIGH YIELDERS, 1912-1914.**

| Variety. | Source. | 1912 | | 1914 | | Av. 2 years. | |
|---|---|---|---|---|---|---|---|
| | | Yield Seed Cotton, Lbs. to Acre. | Rank. | Yield Seed Cotton, Lbs. to Acre. | Rank. | Yield in Lbs. Seed Cotton to Acre. | Rank. |
| Mebane | A. M. Ferguson, Sherman, Texas | 1118.44 | 6 | 811.25 | 6 | 964.84 | 1 |
| King | N. L. Willet Seed Co., Augusta, Ga | 1228.46 | 1 | 673.75 | 14 | 951.10 | 2 |
| Unknown | Texas Seed and Floral Co., Dallas, Texas | 1155.11 | 5 | 701.00 | 13 | 928.05 | 3 |
| Rowden | R. H. Norwood, Wills Point, Texas | 1048.77 | 11 | 797.50 | 7 | 923.13 | 4 |
| Crowder | E. A. Crowder, Marquez, Texas | 990.09 | 13 | 852.50 | 3 | 921.29 | 5 |
| Burns | H. E. Fant, Seneca, S. C. | 898.42 | 14 | 770.00 | 12 | 834.11 | 6 |
| Lone Star | D. M. Crenshaw, Waco, Texas | 825.08 | 15 | 591.00 | 15 | 708.04 | 7 |
| Allen | C. E. Allen, Lindale, Texas | 1210.10 | 2 | ..... | ... | ..... | ... |
| Sure Crop | School of Agriculture, College Station, Texas | 1210.10 | 3 | ..... | ... | ..... | ... |
| Rosser | | 1173.45 | 4 | ..... | ... | ..... | ... |
| Cleveland | N. L. Willet Seed Co., Augusta, Ga | 1118.44 | 7 | ..... | ... | ..... | ... |
| Cook Long Staple | Peter Henderson Co., New York City | 1100.11 | 8 | ..... | ... | ..... | ... |
| Cook Long Staple | N. L. Willet Seed Co., Augusta, Ga | ..... | ... | 783.75 | 10 | ..... | ... |
| Mebane | F. K. McGinnis, Terrell, Texas | 1063.40 | 10 | ..... | ... | ..... | ... |
| Mebane | R. L. Lewis, Beeville, Texas | ..... | ... | 852.50 | 4 | ..... | ... |
| Bank Account | H. G. Hastings & Co., Atlanta, Ga | 1048.77 | 12 | ..... | ... | ..... | ... |
| Broadwell | W. P. Broadwell & Co., Alpharetta, Ga | ..... | ... | 893.75 | 1 | ..... | ... |
| Webber | Oscar Haaga, Memphis, Tenn | ..... | ... | 880.00 | 2 | ..... | ... |
| Roberts | N. L. Willet Seed Co., Augusta, Ga | ..... | ... | 830.00 | 5 | ..... | ... |
| Dongola | N. L. Willet Seed Co., Augusta, Ga | ..... | ... | 788.75 | 8 | ..... | ... |
| Triumph | E. H. Astin, Bryan, Texas | ..... | ... | 783.75 | 9 | ..... | ... |
| Mortgage Lifter | H. G. Hastngs & Co., Atlanta, Ga | ..... | ... | 779.25 | 11 | ..... | ... |

The foregoing results show the King, Unknown, Mebane, Rowden, Crowder, Lone Star, and Burns to be the highest average yielders for the two years, in the order mentioned. It will be seen that the highest yielder was a small-boll cotton, and from that standpoint not so desirable as the other varieties producing still lower yields. It is, however, an early-maturing variety and, from this standpoint, seemingly has some value for this section.

The Mebane, Rowden, Crowder, and Lone Star are all well-known cottons and have proved to be good producers under conditions existing in this section, as set forth in the results above.

## COTTON CULTIVATION.

A test was conducted during the seasons of 1913 and 1914 to determine the effects of frequent and infrequent cultivation on cotton. The tests were repeated four times in 1913 and nine times in 1914.

The cotton used in all cases was Mebane grown on the substation. All plats had similar treatment in every manner except for the difference in cultivation. The plats cultivated frequently received twice as many cultivations as plats cultivated infrequently. The following table shows the average results secured for the two years:

**TABLE 5—FREQUENT AND INFREQUENT CULTIVATIONS.**

| Kind of Cultivation. | Yield of Seed Cotton in Pounds to Acre. | | |
|---|---|---|---|
| | 1913 | 1914 | Average. |
| Frequent | 792.5 | 574.4 | 684.4 |
| Infrequent | 792.5 | 571.0 | 681.7 |

The results recorded in Table 5 show no difference in yield of the frequent and infrequent cultivated plats. It should be stated that the plats cultivated infrequently received a sufficient amount of cultivation to keep down weeds and show no great loss of water by evaporation. This work indicates that the frequent cultivation of the crop does not necessarily increase the yield.

## CORN VARIETY TEST.

Corn variety tests were conducted in 1912, 1913 and 1914. The tests included thirty varieties in 1912, sixty-one in 1913 and twenty-one in 1914. The following table shows the ranks of the thirteen highest yielding varieties of corn in a two-year average, and their respective yields for each year:

**TABLE 6—CORN VARIETY TEST.**

| Variety. | Source. | Yield 1913. Bu. to Acre. | Rank. | Yield 1914. Bu. to Acre. | Rank. | Two year Average '13-'14. Bu. to Acre. | Rank. |
|---|---|---|---|---|---|---|---|
| Thomas | Substation No. 1, Beeville, Texas | 13.49 | 13 | 37.40 | 2 | 25.44 | 1 |
| Surcropper | A. M. Ferguson, Sherman, Texas | 15.28 | 9 | 32.80 | 7 | 24.04 | 2 |
| Cocke's | T. W. Wood & Son, Richmond, Virginia | 9.82 | 28 | 33.20 | 6 | 21.51 | 3 |
| Virginia White Dent | T. W. Wood & Son, Richmond, Virginia | 8.83 | 33 | 33.88 | 5 | 21.31 | 4 |
| Chisholm | A. M. Ferguson, Sherman, Texas | 10.31 | 26 | 31.90 | 9 | 21.10 | 5 |
| Oklahoma White Wonder | Texas Seed and Floral Co., Dallas, Texas | 8.34 | 37 | 32.80 | 8 | 20.57 | 6 |
| Excelsior | T. W. Wood & Son, Richmond, Virginia | 9.82 | 29 | 30.40 | 11 | 20.11 | 7 |
| Blount's | T. W. Wood & Son, Richmond, Virginia | 11.78 | 15 | 28.40 | 14 | 20.09 | 8 |
| Texseed Giant White. | Texas Seed and Floral Co., Dallas, Texas | 6.38 | 43 | 30.20 | 12 | 18.29 | 9 |
| Boone County White. | T. W. Wood & Son, Richmond, Virginia | 9.82 | 30 | 25.70 | 17 | 17.76 | 10 |
| St. Charles White | Chris Reuter, New Orleans, La | 8.83 | 34 | 23.90 | 18 | 16.36 | 11 |
| Creole | Chris Reuter, New Orleans, La | 3.92 | 45 | 27.10 | 15 | 15.51 | 12 |
| Wisconsin White Dent. | Chris Reuter, New Orleans, La | 4.91 | 44 | 19.17 | 19 | 12.04 | 13 |

The foregoing table shows good yields from both Surcropper and Thomas, the first-named being a corn well adapted to limited moisture conditions, and the second being a corn grown locally in this section for twenty-five years. These two varieties have shown good performance throughout the test.

## RELATIVE YIELDS FROM DIFFERENT EARS OF CORN, OF THE SAME VARIETY, DURING THE SEASON OF 1914.

Seed from one hundred and twenty ears of Thomas corn—one of the best varieties for this section—was planted in comparative test plats. Prior to planting, size and weight measurements were recorded for each individual ear. The following table includes the highest and lowest-yielding ears in this test. The table also shows character measurements of the individual ears planted:

**TABLE 7—COMPARATIVE YIELDS OF DIFFERENT EARS OF THOMAS CORN AND CHARACTER MEASUREMENTS OF EARS INCLUDED IN THE TES .**

| Ear No. | Circumference. cm. | Length. cm. | No. Rows. | Weight of Ear, Grams. | Yield in Bushels to the Acre. |
|---|---|---|---|---|---|
| 91 | 15.0 | 16.0 | 16 | 186.0 | 48.86 |
| 101 | 14.5 | 15.0 | 14 | 168.0 | 42.86 |
| 22 | 14.0 | 19.0 | 12 | 190.0 | 42.23 |
| 82 | 15.2 | 18.0 | 14 | 180.0 | 41.14 |
| 55 | 15.5 | 17.0 | 16 | 204.0 | 40.71 |
| 49 | 16.0 | 17.0 | 18 | 209.0 | 40.28 |
| 86 | 17.2 | 17.0 | 16 | 230.0 | 40.28 |
| 41 | 16.5 | 17.0 | 16 | 218.0 | 39.43 |
| 65 | 15.2 | 16.0 | 16 | 214.0 | 39.00 |
| 96 | 16.0 | 1..0 | 14 | 192.0 | 38.43 |
| 79 | 15.0 | 18.0 | 14 | 200.0 | 17.57 |

It is seen that in this test of one hundred and twenty ears of the same variety of corn, the power to produce ranged from 48 bushels in Ear No. 91 to 17 bushels in Ear No. 79. It is also seen that the weight of the ear is not an indication of its power to yield; neither do the results show that a large ear or a long ear is the best producer.

## CORN SEEDING RATE TEST.

A seeding rate test of corn was conducted during the seasons of 1913 and 1914, in which the seeding rates varied from 2420 to 9680 stalks per acre. The year of 1913 was one of extreme drouth whereas in 1914 there was a plentiful supply of moisture. For these reasons the results presented in the following table covering extreme years are not very satisfactory.

TABLE 8—CORN SEEDING RATE TEST. T. S. NO. 327, THOMAS CORN.

| Distance Between Stalks in 3-ft. Rows. | Stalks Per Acre. | Yield of Corn in Bushels to the Acre. | | |
|---|---|---|---|---|
| | | 1913 | 1914 | Average. |
| 72 inches | 2420 | 10.90 | 26.50 | 18.70 |
| 48 inches | 3630 | ..... | 33.30 | ..... |
| 36 inches | 4840 | 5.41 | 37.08 | 21.24 |
| 30 inches | 6050 | ..... | 36.96 | ..... |
| 24 inches | 7260 | 0.83 | 39.92 | 20.37 |
| 21 inches | 8470 | ..... | 36.35 | ..... |
| 18 inches | 9680 | 0.27 | ..... | ..... |

The results presented in the foregoing table show the best yields in 1913 from the thinnest seeding rates and practically no yields from the thickest seeding rates. The results in 1914 show a gradual increase in the yield up to 4840 stalks to the acre, or the equivalent of single stalks 3x3 feet apart on the land. Seeding rates thicker than this gave no consistent increase in yield. The average yield for the two seasons shows the highest is from the plats planted at the rate of 4840 stalks to the acre, or the equivalent of stalks 3x3 feet on the land, and this seeding rate in all probability closely represents the proper seeding rate. This work is being continued and will become of greater value when the results are secured for a period of several consecutive years.

DISTRIBUTION OF CORN PLANTS ON THE LAND.

Work was conducted in 1913 and 1914 in which plats of corn were planted with the same number of stalks to the acre but with different distribution of stalks on the land. There were left 4840 plants on each of three plats, and distributed as follows:

(1) Rows three feet wide; stalks three feet apart in the row.

(2) Rows six feet wide; stalks eighteen inches apart in the row.

(3) Three-foot rows in pairs nine feet apart; stalks eighteen inches apart in the row.

T. S. No. 327, Thomas corn, was used throughout this test and the cultivation and other treatment of all plats was identical except for the arrangement of stalks on the land. The table below shows the results of all tests for the two years:

TABLE 9—DISTRIBUTION OF CORN PLANTS AND EFFECT ON YIELD.

| Distribution of Plants. | Number Stalks to Acre. | Yield to the Acre in Bu. 1913 | Yield to the Acre in Bu. 1914 | Average Yield in Bu. to the Acre. |
|---|---|---|---|---|
| Three-foot rows, hills 36 inches apart | 4840 | 6.85 | 39.95 | 23.40 |
| Six-foot rows, hills 18 inches apart... | 4840 | 8.56 | 35.18 | 21.87 |
| Pairs of 3-foot rows, 9 feet apart.... | 4840 | 8.14 | 33.14 | 20.64 |

The results given in Table 9 show a slight increase in the yield for 1913 in favor of rows six feet apart, as against a slight increase for

1914 in favor of rows three feet apart. The average for the two years is in favor of rows three feet apart. The difference in yield, however, from the three distributions is relatively small, indicating that the distribution of stalks on the land has little influence on yield. This work is being continued and will not be conclusive until the test is continued over a period of at least five or six years. Planting in six-foot rows has a slight practical advantage, in that it allows the farmer to plant cowpeas between corn rows during the late growing period. The wide rows also prove of much practical value where the land is foul and requires much cultivation, as in wide rows a larger proportion of work can be done with a cultivator and a relatively smaller proportion with a hoe.

### CORN WITH COWPEAS VERSUS CORN WITHOUT COWPEAS.

In 1913 a test was made in which corn with cowpeas was compared to corn grown alone. The average of all plats planted to corn and cowpeas as compared to corn alone showed no reduction in yield of corn, provided the cowpeas were planted after the corn had approached maturity. The planting of cowpeas in corn during the early period of growth of the corn in 1912 caused a reduction in yield of corn of almost one-half.

### OATS VARIETY TEST FOR HAY.

A variety test of oats was begun in 1912. The crop was harvested for hay, and the cured hay yields are shown in the following tabulation:

| | |
|---|---|
| Texas Red Rust Proof | 9550 pounds to the acre. |
| Hundred Bushel | 8830 pounds to the acre. |
| Appler | 8430 pounds to the acre |
| Tennessee Turf | 6130 pounds to the acre. |

The Texas Red Rust Proof variety made the best growth and was less injured by rust than any other variety, being about forty inches high when cut for hay, and was only slightly rusty. The Tennessee Turf oats rusted very badly and the hay was almost worthless. Hundred Bushel and Appler varieties were both good, but not so good as the Texas Red Rust Proof.

A similar test conducted in 1914 was a failure, on account of excessive rains prior to harvesting. In this test Texas Red Rust Proof made a very creditable showing up to the time of the rains.

Texas Red Rust Proof oats planted in rotation work for hay gave yields as follows:

| | |
|---|---|
| 1913 | 4960 pounds to the acre. |
| 1914 | 2220 pounds to the acre. |

Oats are not of value for grain in this section, except in rare instances. They are very valuable as grazing crops, and the results herein reported show considerable value for hay.

## COWPEA RATE OF SEEDING TEST.

A cowpea rate of seeding test was conducted in 1913 and 1914. A station-grown strain of Whippoorwill cowpea was used. The 1913 figures represent the average of two plats and the 1914 figures an average of three plats. The table below shows the results secured:

**TABLE 10—COWPEA RATE OF SEEDING TEST. HAY YIELDS.**

| Rate of Seeding, Pounds to the Acre. | Manner of Planting. | Yield of Hay in Pounds to the Acre. | | |
|---|---|---|---|---|
| | | 1913 | 1914 | Average. |
| 30 | Broadcast... | 2000 | 2750 | 2375 |
| 60 | Broadcast... | 1800 | 2832 | 2316 |
| 80 | Broadcast... | 2000 | 3732 | 2866 |
| 18 | 3-ft. rows.... | ..... | 2750 | ..... |
| 12 | 3-ft. rows.... | ..... | 1650 | ..... |

Little difference in yield is noted between the 30, 60 and 80-pound seedings in 1913. During the season of 1914, however, the yields are consistently in favor of the heavier seedings, as are also the average yields for the two years.

## PEANUT VARIETY TEST.

Six varieties of peanuts were tested in 1912 and 1913. The results of this variety test are shown in the following table:

**TABLE 11—PEANUT VARIETY TEST 1912-1913.**

| Variety. | Yield in Bushels to the Acre. | | |
|---|---|---|---|
| | 1912 | 1913 | Average. |
| Spanish | 26.8 | 36.25 | 31.52 |
| African | 12.1 | 29.99 | 21.04 |
| Virginia | 15.3 | 26.66 | 20.98 |
| Jumbo | 13.2 | 30.65 | 21.92 |
| Tennessee Red | 12.8 | 15.99 | 14.39 |
| North Carolina Running | 9.8 | 31.99 | 20.89 |

The small Spanish peanut has shown a much better average yield than the other varieties included in the test, and is, therefore, recommended over other varieties for this section.

## METHOD OF SEEDING PEANUTS.

A series of plats in which six different varieties of peanuts were planted, in rows eighteen and thirty-six inches apart, were carried both in 1912 and 1913. The results of these tests are shown in the following table:

TABLE 12—METHOD OF SEEDING TEST 1912-1913.

| Variety. | Manner of Planting. | Yield to Acre in Bushels. 1912 | 1913 | Average 1912 and 1913 | Average for Seeding Rates |
|---|---|---|---|---|---|
| | Rows | | | | |
| Spanish | 3-foot | 20.9 | 28.75 | 24.82 | |
| African | 3-foot | 13.1 | 25.33 | 19.21 | |
| Virginia | 3-foot | 12.5 | 32.00 | 22.25 | |
| Jumbo | 3-foot | 15.0 | 28.00 | 21.50 | |
| Tennessee Red | 3-foot | 11.8 | 14.66 | 13.23 | |
| N. C. Running | 3-foot | 11.5 | 29.33 | 20.41 | |
| | | | | | 20.24 |
| Spanish | 18-inch | 32.8 | 43.75 | 38.27 | |
| African | 18-inch | 11.2 | 34.66 | 22.93 | |
| Virginia | 18-inch | 18.1 | 21.33 | 19.71 | |
| Jumbo | 18-inch | 11.5 | 33.30 | 22.40 | |
| Tennessee Red | 18-inch | 13.9 | 17.33 | 15.61 | |
| N. C. Running | 18-inch | 8.1 | 34.66 | 21.38 | |
| | | | | | 23.38 |

It is seen that the average yield of nuts from all varieties planted in eighteen-inch rows exceeds the yield of the same varieties planted in thirty-six-inch rows, by three bushels to the acre. The short period over which the test has been carried makes it impossible to consider these results as conclusive. The results obtained, however, strongly indicate that peanuts should be grown in rows as narrow as will allow easy cultivation, or if the rows are wider there should be a heavy stand in the row.

## SOY BEAN VARIETIES.

During the years 1912, 1913 and 1914 variety tests of soy beans were conducted. The 1912 test included eleven varieties, all of which made very promising growth until pods were formed, when excessive rains seemed to favor the development of anthracnose, which ruined the seed crop. In 1913 and 1914 rabbits destroyed the test when the plants were young and tender. The soy bean grows well here and makes a good forage yield when grown on land protected from rabbits.

## MISCELLANEOUS LEGUMES.

Various newly introduced legumes have been tested on the substation. Among these, guar, jack bean (*Canavalia ensiformis*), beggarweed, kulthi bean, moth bean, velvet bean and *Dolichos lablab* have produced fair growth, but seem unsuited to the conditions here. Vetch was not found very satisfactory as a crop. The winters seem too dry for this crop.

## ALFALFA TESTS.

Alfalfa, including both the common and the Turkestan varieties, was seeded in the fall of 1911. These plats made very promising growth the first year, as shown below.

| Variety. | Yield Cured Hay, Pounds to the Acre. | | |
|---|---|---|---|
| | First Cutting. | Second Cutting | Total. |
| Common | 1050 | 1400 | 2450 |
| Turkestan | 1000 | 1000 | 2000 |

The common alfalfa gave consistently higher yields than Turkestan. After cutting, the plants were irrigated, and later died of cotton root rot disease. Since 1912 other tests have been made with alfalfa with no satisfactory results.

CLOVER.

Sweet Clover (*Melilotus alba*) has been tested and makes good growth here, but it attacked by cotton root rot disease. It makes a heavier growth than alfalfa and seems to grow as well without as with inoculation in this soil. This crop has promise in this section when properly used in the cropping system.

Red, white and crimson clovers have been tested on the substation, but have not made satisfactory growth. Crimson clover has been attacked by nematodes, which handicapped it seriously. On the lighter land, where abundance of moisture is available, crimson clover shows some promise. The burr clovers have been grown very satisfactorily on the substation since 1912. All varieties tested (six in number) have made very satisfactory growth and are apparently well adapted to this section. They are especially good during seasons of abundant rainfall.

GRAIN SORGHUM VARIETIES.

Grain sorghum is a dependable crop in this section. Some work has been done toward comparing the different varieties and strains for grain and forage production. The standard varieties were grown both in 1913 and 1914. Test plats were carried in triplicate each season and both grain and total forage yields secured. The results are shown in the following table:

**TABLE 13—GRAIN SORGHUM VARIETIES! 1913-1914.**

| T. S. No. | Variety. | Cured Forage Yield. Pounds to Acre. | | | Grain Yield. Pounds to Acre. | | |
|---|---|---|---|---|---|---|---|
| | | 1913 | 1914 | Average. | 1913 | 1914 | Average. |
| 44 | Blackhul Kafir | 7915 | 6650 | 7282 | 24.4 | 22.3 | 23.35 |
| 46 | Red Kafir | 8616 | 3200 | 6408 | 11.0 | 8.1 | 9.50 |
| 43 | Milo | 3586 | 3360 | 3473 | 17.6 | 12.25 | 14.92 |
| 47 | Feterita | 10266 | *3400 | 6333 | 23.4 | *7.0 | 15.20 |
| 397 | Shallu | 7513 | 2876 | 5194 | 23.4 | 14.1 | 18.75 |
| 396 | Jerusalem Corn | 2777 | ..... | ..... | 13.9 | ..... | ..... |

*Very poor stand.

The results in the foregoing table show the best grain yields from blackhul kafir, in both 1913 and 1914. Shallu and feterita both made good grain yields in 1913, but the latter made a poor yield in 1914 on account of a poor stand. Milo has made only a fair yield the two seasons, while red kafir made a very poor yield. Jerusalem corn also produced very poor grain yields. In forage production the varieties ranked in average yield for the two years as follows: blackhul kafir, red kafir, feterita, shallu, and milo. In grain yields the varieties rank in the table as follows: Blackhul kafir, shallu, feterita, milo and red kafir. The feterita would probably have ranked second in the average but for the poor stand in 1914.

### GRAIN SORGHUM SEEDING RATE TESTS.

Seeding rate tests were conducted in 1912, 1913 and 1914, and while the results are not as yet considered conclusive, the indications are that the grain sorghums should be planted six to eight inches apart in the row. This work is being continued and will be reported later in detail.

### SORGO SEEDING RATES FOR HAY.

In 1912 a test was conducted in which Sumac and Amber sorgos were used. All plats were in rows three feet apart with the plants spaced in the rows from one-fourth inch to six inches apart. The plats were 1/20-acre in size. The results are shown in the following table:

**TABLE 14—SORGO SEEDING RATES 1912.**

| Average Distance Between Plants in Row. | Yield Tons Cured Hay to the Acre. | |
|---|---|---|
| | Amber. | Sumac. |
| 1-4 inch | 2.40 | 8.20 |
| 1-2 inch | 2.25 | 8.35 |
| 1 inch | 2.80 | 8.70 |
| 2 inches | 2.35 | 7.80 |
| 4 inches | 1.85 | 6.95 |
| 6 inches | 1.45 | 6.15 |

These yields indicate that under conditions of favorable rainfall, such as existed during 1912, Sumac is decidedly superior for hay to the Amber, and that the thick seedings are more productive than other methods of planting. A supplemental test conducted in both 1912 and 1913, in which two varieties were planted in close drills at 25, 50 and 100 pounds to the acre, showed the following results:

**TABLE 15—SORGO SEEDING RATES IN CLOSE DRILLS.**

| Rate of Seeding, Pounds to the Acre. | Yield in Tons Cured Hay to the Acre. | | | | | |
|---|---|---|---|---|---|---|
| | Amber. | | Sumac. | | Average. | |
| | 1912 | 1913 | 1912 | 1913 | Amber. | Sumac. |
| 25 | 3.05 | 4.75 | 7.50 | 8.53 | 3.90 | 8.00 |
| 50 | 4.00 | 4.95 | 8.00 | 9.40 | 4.47 | 8.70 |
| 75 | 4.00 | ..... | 8.30 | ..... | ..... | ..... |
| 100 | 3.60 | 4.54 | 7.00 | 8.97 | 4.02 | 7.98 |

It is seen from the foregoing table that the best yields in this test came also from the Sumac variety. The test showed, too, that the 50-pound seeding rate gave better yields in both varieties than the 25- or 100-pound seedings.

### SUDAN GRASS METHOD OF SEEDING TEST.

A method of seeding test with Sudan grass was conducted in 1913 with the following results:

**TABLE 16—SUDAN GRASS METHOD OF SEEDING TEST.**

| Method of Planting. | Yield of Hay in Pounds to the Acre. | Yield of Seed in Pounds to the Acre. |
|---|---|---|
| 3-foot rows | 11240 | 400 |
| 18-inch rows | 10420 | 360 |
| Broadcast | 9400 | 380 |


Figure 1.—Second cutting of Sudan grass, being harvested for hay on July 9, 1913.

In the foregoing table it is seen that the three-foot row seeding gave the best yields of both hay and seed.

### SUDAN GRASS RATE OF SEEDING TEST.

In 1913 four different seeding rates were tested in duplicate. The plats were cut four times. The last two cuttings were not of much value as the grass had rusted to some extent.

TABLE 17—YIELD OF HAY SEEDING RATE.

| Rate of Seeding, Pounds to the Acre. | Total Yield, Tons to the Acre. |
|---|---|
| 15 | 4.40 |
| 20 | 4.40 |
| 30 | 4.50 |
| 40 | 4.55 |

In this test, as shown in Table 16, there is practically no difference in yield between the different seeding rates.

### SUDAN GRASS AND COWPEA MIXTURES.

Sudan grass and cowpeas were planted together for hay with unsatisfactory results. The best yield was had from plats planted to a mixture made up of 12 pounds of Sudan grass seed and 60 pounds of cowpea seed and seeded at the rate of 72 pounds to the acre. The planting of Sudan grass and cowpeas together on the same land is not recommended as a general field practice.

### JAPANESE SUGAR CANE.

Japanese sugar cane was planted in 1912 and made good growth, considering the late summer drouth. In the spring of 1913 a good stand came from the stubble. This was also the case in 1914. Detailed results secured with this crop at this substation are reported in Texas Agricultural Experiment Station Bulletin No. 195.

### TEOSINTE.

Teosinte was grown in 1913 and produced a fair crop of forage. This crop, however, is not thought to be as valuable for forage in this section as the sorgos.

### SEED BED PREPARATION.

Work was conducted in 1913 and 1914 to secure information as to the best method of preparing the seed bed. The results of this work are shown in the following table:

TABLE 18—SEEDBED PREPARATION EXPERIMENT.

| Method of Preparing Land. | Yield to Acre. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1912 | | 1913 | | | 1914 | | | Average. | | | |
| | Corn Bu. | Seed Cotton Lbs. | Corn Bu. | Kafir Bu. | Seed Cotton Lbs. | Corn Bu. | Kafir Bu. | Seed Cotton Lbs. | Corn Bu. | Kafir Bu. | Seed Cotton Lbs. | |
| Plowed 8-in. | 31.94 | 490 | 12.12 | 20.00 | 480 | 33.7 | 29.66 | 470 | 25.9 | 24.8 | 480 | |
| Plowed 6-in. | 26.38 | 520 | 12.77 | 26.66 | 540 | 34.4 | 30.33 | 547 | 23.1 | 28.5 | 535 | |
| Plowed 4-in. | 19.58 | 500 | 12.77 | 16.66 | 660 | 33.9 | 23.99 | 590 | 18.7 | 20.3 | 583 | |
| Listed | 29.72 | 560 | 13.33 | 10.00 | 600 | 31.8 | 30.99 | 600 | 24.9 | 20.5 | 586 | |
| Plowed12-in. | 11.66 | *530 | 15.00 | 21.66 | 600 | 29.6 | 30.33 | 515 | 18.7 | 25.9 | 548 | |
| Not plowed | 26.38 | 400 | 10.27 | 16.66 | *140 | 24.7 | 25.16 | 675 | 20.4 | 20.9 | 405 | |

*Poor stand.

It is seen from Table 18 that the best yields were from corn where the land was plowed eight inches deep or listed eight inches deep. The best yields of cotton were from land listed eight inches deep. The best yield of kafir came from land plowed six inches deep, with only a fair yield from the listed plats. Based on this work, therefore, it is seen that either listing or plowing the land six or eight inches deep is good preparation for corn, cotton and kafir.

## VEGETABLES.

*Asparagus.* An asparagus bed was set in 1911 and has been kept up for several years. It does very well on this substation, but the soil is somewhat too heavy for its best growth. It would do better on a deep, loamy soil. This crop requires a soil rich in humus and an abundance of moisture. It will thrive when fertilized with barnyard manure and some salt. The tips must be kept back during the bearing season.

*Beets.* Several varieties of beets were grown with success. Early Egyptian and Blood Turnip are very good varieties and are early and tender and will stand well in the field. Sugar beets grow very well and are excellent for both table use and stock. They have a fairly high sugar content, but it is not sufficient to make them profitable for sugar purposes.

*Cabbage.* The cabbage crop is usually a very satisfactory truck crop in this section. Cabbage grows well with some irrigation, but does not do well without sufficient water. Flat Dutch and the Drumheads are the best varieties. These varieties have produced as high as eight tons to the acre. Six tons is a normal yield under irrigation.

*Cauliflower.* Cauliflower has not been grown to any great extent, but with care and irrigation it will make very fine yields. It will not yield as high as the cabbage, but will easily make one ton to the acre. Snowball, Gilt Edge, and Dwarf Erfurt are the best varieties. Snowball is exceptionally good on account of the fact that it has a tendency to cover the head with its own leaves and makes blanching easier.

*Lettuce.* Lettuce is a crop that produces well here. Of the varieties tested, Big Boston, Wonderful, and California Cream Butterhead are the best. The best yield secured from lettuce in eighteen-inch rows was two tons to the acre. Fertilizing with nitrogenous fertilizers increases the yield considerably. Lettuce is a crop that requires considerable water and without irrigation will do very little in this section. If the plant is stunted in growth by either drouth or cold, it has a tendency to go to seed instead of making a head.

*Potatoes.* The potato crop is not very certain in this section, but where a light, loamy soil with considerable organic matter is used, a fair yield is obtained. Some variety testing has been done, as well as some fertilizer work, with potatoes. In these variety tests Bliss Triumph, Early Rose, Irish Cobbler and Gold Coin have yielded best. One of the best varieties is the Bliss Triumph. As a rule, the earlier potatoes are the best in this section.

In the fertilizer test, Bliss Triumph was the variety used. The fertilizer was applied by hand at the time the potatoes were planted and was mixed in the row with a sweep and the potatoes planted by hand. All plats were cultivated three times. This test was made in the fall.

TABLE 19—YIELD OF POTATOES IN FERTILIZER TEST.

| Fertilizer Used. | Average Yield, Bushels to the Acre. |
|---|---|
| None—check plat | 53.21 |
| Cotton seed meal, 400 pounds to acre | 61.50 |
| None—check plat | 66.00 |
| Acid phosphate, 400 pounds to acre | 59.63 |
| None—check plat | 63.24 |
| Sulphate of potash, 400 pounds to acre | 52.24 |
| None—check plat | 65.99 |
| Cotton seed meal, 200 pounds to acre; acid phosphate, 200 pounds to acre | 89.83 |
| None—check plat | 56.33 |
| Cotton seed meal, 200 pounds to acre; acid phosphate, 200 pounds to acre; sulphate of potash, 200 pounds to acre | 80.66 |

The foregoing test averages are from a duplicate test.

The average of all check plats is 60.95 bushels.

It will be noticed that the plats receiving cotton seed meal alone make a slight increase over the unfertilized plats, but that the plats which received sulphate of potash alone and acid phosphate alone did not average as high as the average of the check plats. The highest yield is made by the plats receiving acid phosphate and cotton seed meal in combination, and the second best yield is from a complete fertilizer. In the combination involving sulphate of potash, it will be noticed that the yield is not as good as where the sulphate of potash is left out. This may indicate that the presence of the sulphate hinders the assimilation of the other elements.

While the results of this test are not conclusive, the work done indicates that acid phosphate in combination with a nitrogenous fertilizer will be beneficial and in all probability the best fertilizer for potatoes in this soil, which is a Victoria loam.

*Tomatoes.* Tomatoes are very successful here. Earliana, Stone, Acme, and Dwarf Champion are among the best varieties. Three tons of tomatoes to the acre is not an exceptional yield. It is necessary to irrigate to produce satisfactory crops, and spraying with Bordeaux mixture and Paris-green is necessary to the best success. In fertilizer tests, a complete fertilizer at the rate of 300 pounds to the acre, made the highest yield—3.67 tons to the acre. Nitrogenous fertilizers in combination with acid phosphate made the next highest yield—3.36 tons to the acre. These tests indicate that in this soil a complete fertilizer is essential and that the nitrogenous fertilizers are most important.

*Onions.* This section is well adapted to onion culture and in the past much work has been done with this crop. In recent years very little has been done in this connection. The Bermuda onion is by far the best variety for this country. The White Bermuda, Chrystal Wax

Bermuda and the Red Bermuda are the best, probably in the order mentioned. Yields of from fifteen to twenty tons to the acre have been made with the Red and White Bermuda onions. The Northern varieties do not do well here and they keep very poorly.

*Radishes.* The radish crop is very successful in this section. Owing to the very quick maturity, a succession of crops can be produced until hot weather. There is usually a strong Northern market for radishes. French Breakfast, Scarlet Globe, Scarlet Turnip, and Half Long Scarlet are the best varieties. Either of these varieties produces about 10,000 bunches to the acre.

*Peas.* Little work has been done with peas. They do not fill out well or make a very satisfactory yield here. Acid phosphate helps them


Figure 2.—Earliana tomatoes grown in 1912, showing method of staking. These plants have been pruned.

considerably in combination with a nitrogenous fertilizer. Extra Early Alaska, Marrowfat and Gradus are among the best varieties. They yield from 800 to 1000 pounds of green peas to the acre.

*Beans, Green.* The beans do very well here as a rule, but they are subject to the attack of anthracnose to some extent. Burpee's Stringless Green Pod and the Bountiful are good varieties and yield from one to two tons of green beans to the acre.

*Beans, Dry.* The dry bean industry is of some importance in this section. The chief variety for this purpose is the California Pink, commonly known as the frijole bean. These beans are capable of making two good crops a year, one in the early spring and the other in the fall. The average yield is about 500 pounds to the acre. The crop usually brings a good price.

## CITRUS FRUITS.

The citrus fruit trees suffered severely during the winters of 1910-1911 and 1911-1912. The season of 1912 was begun with the old trees frozen almost to the ground. These trees recuperated rapidly, made a good growth, and in 1913 bore some fruit. A very good crop was produced in 1914. The table below shows the varieties of oranges grown, the number of trees of each variety, and the average yield in 1914, to the tree, of each variety:

**TABLE 20—YIELD OF ORANGES 1914**

**Forty-two varieties; 323 trees.**

| Variety. | Number and Age of Trees. | Average Number Fruits to the Tree. |
|---|---|---|
| Satsuma | 171 (all ages) | 248 |
| Dugat | 37 (all ages) | 300 |
| Navel | 27 (all ages) | 90 |
| Carnegie | 3 (young) | 13 |
| Jaffa | 5 (all ages) | 48 |
| Pineapple | 4 (all ages) | 74 |
| Parson Brown | 4 (all ages) | 108 |
| Mandarin, King | 3 (young) | 25 |
| Mandarin | 4 (all ages) | 63 |
| Mandarin, Oneca | 2 (old) | 170 |
| Mandarin, Tangerin | 5 (all ages) | 49 |
| Old Vini | 3 (all ages) | 81 |
| Madam Vinous | 5 (all ages) | 62 |
| Magnum Bonum | 4 (all ages) | 66 |
| Valencia | 2 (young | 20 |
| Ruby | 4 (all ages) | 25 |
| Mediterranean | 4 (all ages) | 63 |
| Carleton | 3 (young) | 12 |
| Nonpariel | 5 (all ages) | 36 |
| Homasassa | 2 (young) | 12 |
| Boone Early | 2 (old) | 85 |
| Maltese Oval | 3 (old) | 60 |
| Duroi | 2 (old) | 45 |
| Centennial | 1 (old | 36 |
| Majorica | 1 (old | 24 |
| Hybrids | 17 (young) | 00 |

The Dugat orange is the most prolific bearer, with the Satsuma ranking next. This is usually the case. The Dugat is a very good variety. The Navel produces excellent fruit, but is rather a poor bearer here. This is probably due to lack of moisture. No doubt all the citrus fruits would produce better under irrigation. The Satsuma, while not a very good shipping orange, is very popular and is a very good variety for this section. It is probably more cold-resistant and disease-resistant than most of the round oranges. It is earlier than any other orange in the test, beginning to ripen about October 25 as a rule. It is the last to bloom in the spring and consequently escapes the danger of frost at the time of blooming. It is drouth-resistant and usually goes into the dormant stage early in the winter.

## LEMONS.

There are twelve lemon trees on the substation, representing four varieties. These trees are very tender toward frost, and were more

severely injured in the freezes than any other citrus fruits. In 1914 only on variety produced lemons. One Villafranca tree bore eighteen fruits, which were excellent in quality and flavor. The lemon is not a commercial crop in this section. It is killed back almost every winter so that it will not produce fruit.

### POMELO.

The pomelo (grapefruit), while less frost-resistant than the orange, produces very well here. In the table below are shown the number of

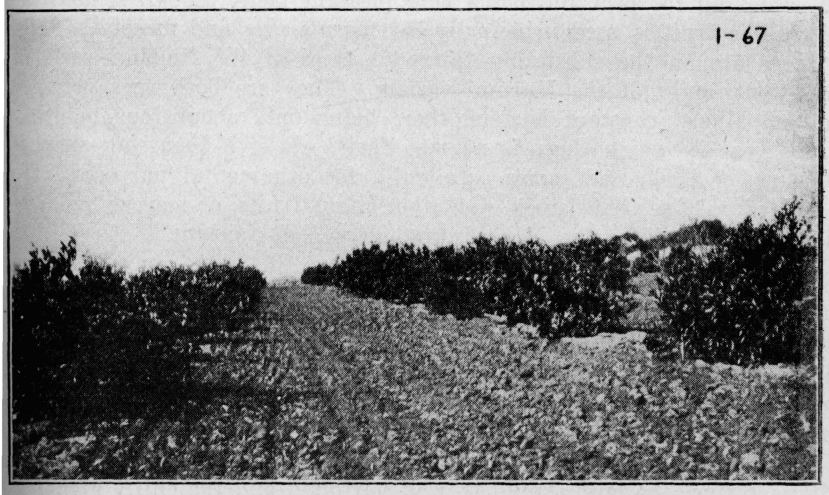


Figure 3.—Showing Satsuma orange trees on Experiment Station farm. This is the most successful variety here.

trees, the varieties represented, and the average yield for the season of 1914:

TABLE 21—POMELO YIELD—1914.

| Variety. | Number of Trees. | Average Number of Fruits to the Tree. |
|---|---|---|
| Duncan | 20 (all ages) | 49 |
| Marsh Seedless | 8 (young) | 5 |
| McCarthy | 4 (young) | 21 |
| Bowen | 2 (old | 160 |
| Triumph | 7 (old | 54 |
| Tresca | 5 (old) | 27 |
| Hall Silver | 1 (old) | 96 |
| Pernambuco | 4 (old) | 89 |
| Royal | 4 | 90 |

Of the nine varieties, the Duncan, Pernambuco, and Royal are probably the best in quality. The Royal is almost lacking in the usual bitter taste of the pomelo and for that reason is popular. The Marsh Seedless variety is not seedless, but has somewhat fewer seeds than most varieties. These yields in 1914 are not representative. It is

not uncommon for these trees to produce from three hundred to five hundred fruits.

### KUMQUATS.

The kumquat is a variety of small citrus fruit resembling a small orange. Of this fruit there are two varieties on the substation, the Marumi and the Nagami. Both are of Japanese origin. The Marumi is a small, round kind, from one-half to three-quarters of an inch in diameter. The Nagami is an elongated variety, about three-fourths of an inch long and one-half inch in diameter. This fruit is eaten without removing the peel and has a very pleasant taste, though somewhat acid. The fruit is used principally for marmalades and preserves.

There are on the substation thirty-six trees of the Nagami variety and twenty-eight of the Marumi variety. They are both very prolific and are almost constant bearers, there being only about four months of the year in which there is no ripe fruit. It is a beautiful, shrub-like tree, or bush, and serves excellently for ornamental purposes. It is budded on *Trifoliata* stock, like other citrus fruits, or may be budded on sour stock. The tree is hardy and very cold-resistant.

### CITRUS ORCHARD MANAGEMENT.

To get the best growth and production of fruit, it is necessary to handle the citrus orchard carefully. It is best in the early spring to plow the orchard to a depth of about eight inches if it has been regularly plowed to that depth. If it has never been plowed that deep, it is advisable to not plow more than one inch deeper than is usual. After plowing, the land should be well harrowed and the entire orchard kept as free from weeds and in as thorough a state of cultivation as possible up to about the first of September. Then cultivation should cease. It may be desirable to plant some fall cover crop in the orchard to take up the excess of moisture and prevent the growth of the trees in winter. It is very essential that the trees become dormant in time to escape the winter freezes. If cultivated through the winter, the moisture is conserved and the trees will have a tendency to continue growth. The cover crop not only helps to keep the trees from growing, but will add humus and some nitrates as well if legumes are used. The legumes are probably the best to use for this purpose. The Canada field pea and burr clover make good cover crops.

Where the rust mite is present, it is advisable to spray with lime-sulphur solution in the spring and early summer before hot weather. It is best to spray first at the time the little fruits are about setting. If scab is present, Bordeaux mixture should be used for spraying. The lime-sulphur solution is also good for scales, as are the kerosene emulsions.

During dry seasons it is necessary to irrigate the orchards to get a good crop of fruit. It is very probable that irrigation at regular intervals would help the yield and growth of the trees very materially.

## ORCHARD HEATING.

As a rule, the winters in this section are comparatively mild, but occasionally the temperature gets rather low for citrus fruits. On these occasions it is necessary to take steps to protect the trees from freezing. In 1911 orchard heaters were tried for the first time on this substation. The results of this heating work have been published in Bulletin No. 148, which describes the use of the heaters and shows some of the results of their use. It is very doubtful whether the trees could have been saved without the use of these heaters, as many orchards in this section were killed at that time. It is possible to raise the temperature on an average of about seven degrees Fahrenheit. This will mean a great deal when we consider that eighteen degrees Fahrnheit is the critical temperature. Seven degrees, therefore, will add a great deal

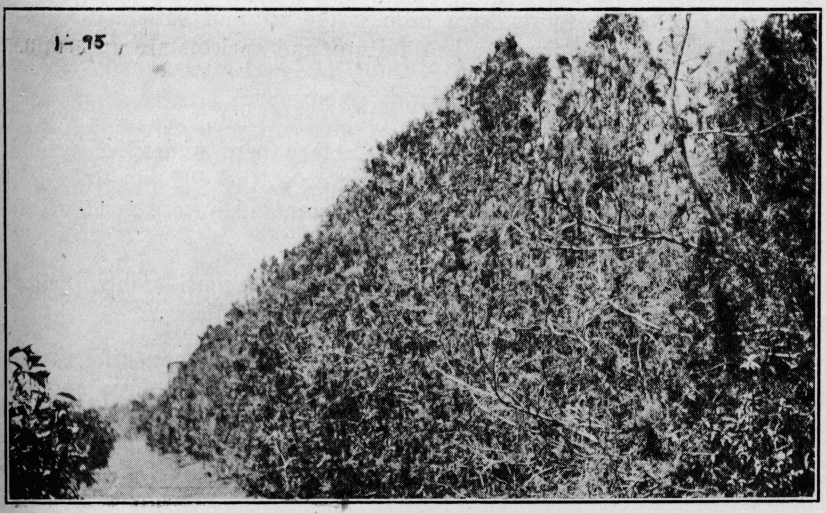

Figure 4.—Arbor vitae hedge used as windbreak on northwest side citrus orchard. This makes an excellent windbreak here.

to the safety of the tree. In the use of orchard heaters one great difficulty presents itself. The heaters are very hard to refill in cold weather on account of the paraffin base of the oil which must be used. This oil will congeal to such an extent that it will not flow when cold. Oil with an asphaltum base would obviate this trouble.

The cold weather here is usually attended with strong north winds which also make the retention of heat almost impossible. To prevent this, for protection against these winds, windbreaks are used around parts of one orchard. These help very materially and are recommended for protection to orchards. Chinese arbor vitae and *Legustrum Japonica* are excellent windbreaks. The latter makes the better growth in a short time.

### MISCELLANEOUS FRUITS.

A number of miscellaneous fruits have been grown with more or less success. Peaches and plums have done indifferently well. Figs are uncertain and the trees soon die of root rot disease. Grapes have not made a satisfactory showing, though early records show some fairly good yields. The peach is an uncertain crop in this section. The Florida Gem peach is one of the best varieties here. Plums are only reasonably certain of production. Some plums have produced good crops. Of these, the Bartlett, the Wickson, Excelsior, and the El Paso varieties are the best. Pears are of little value here, though the Garber and Sewanee varieties have borne some inferior fruit. The persimmon produces well here, and the Tsuru, Yeddo Ichi, Yemon Hoyokume, and Tanni Nachi varieties have borne well. The fruit is very good, but is depredated upon to a considerable extent by birds.

A number of other fruits have been tested without satisfactory results. Apples have been practically a failure, and apricots are uncertain.

### SMALL FRUITS.

*Blackberries.* This crop is very satisfactory here under irrigation. No accurate acre yields have been taken owing to the difficulty in gathering the berries, but they are successful, command a very good price, and have a ready sale as a rule.

*Dewberries.* Dewberries are very good and are considerably earlier than the blackberries. They do better under irrigation.

*Strawberries.* The strawberries do very well, but are difficult to carry through the summer. It is necessary to irrigate them and to mulch they well in order to save the plants.

### SUMMARY.

This is a progress report covering the work on this substation from 1910 to and including 1914, and is a summary rather than a detailed record.

Substation No. 1, Beeville, having been established in 1895, is the oldest of the substations of the Texas Agricultural Experiment Station.

Results from this substation have been published in earlier bulletins.

The farm land on which the work of the substation is done is representative of this part of the State.

Records of the maximum and minimum temperatures, precipitation, and first and last frosts are presented for the years 1910 to 1914, inclusive. The precipitation record shows that there are two marked periods of rainfall, these being in the spring and fall. The normal annual rainfall is a trifle less than thirty-two inches.

Extensive cotton variety tests were conducted in 1912, 1913 and 1914.

Several of the best yielding cotton varieties are named. The ones ranking highest in order are: Mebane, King, Unknown and Rowden.

Extensive corn variety tests were conducted in 1912, 1913 and 1914. The varieties which have made the best average yields are Thomas and Surcropper.

Corn yields are sometimes reduced because of drouth, and for this reason a perfect stand should not be thicker than 3x3 feet for each stalk.

Variety tests of peanuts were conducted in 1912 and 1913. The Spanish has made much the best yields. The best yields of peanuts have been secured from heavy stands.

Burr clover has been grown very satisfactorily.

Alfalfa has not been a satisfactory crop.

Grain sorghum variety tests have been conducted, blackhul white kafir having made the best yields.

Sumac sorghum has made better storage yields than Amber.

Sudan grass in three-foot rows has given better yields than in eighteen-inch rows or broadcast. When broadcasted, heavy seeding rates have given slightly larger yields than light seeding rates.

In a seedbed preparation test covering three years, good yields have been obtained from land which was either plowed or listed six or eight inches deep.

Results of tests and experiments with vegetables are presented and recommendations made as to the best varieties and the best methods of producing beets, cabbages, cauliflower, lettuce, potatoes, tomatoes, onions, radishes and beans.

An extensive series of variety tests with forty-two varieties of oranges, consisting of 323 trees, is reported upon. The Dugat and the Satsuma are judged to be the two best varieties, and are making very satisfactory yields.

The lemon is not a satisfactory crop.

Pomelo (grapefruit) is less frost-resistant than the orange, but is producing very well. A variety test of nine varieties, including 55 trees in all, is reported upon. The Duncan, Pernambuco and the Royal varieties are especially recommended.

The kumquat, a fruit used principally for marmalades and preserves, is very successful.

Recommendations for the management of citrus orchards are made.

Peaches, plums, figs, grapes, pears, apples and apricots have been tested with indifferent results.

The persimmon makes very satisfactory yields.

Strawberries are difficult to carry through the summer.

Blackberries and dewberries do very well in this region and there is a good demand for the fruit.